PATENT SPECIFICATION (11) 1206584

1206584

NO DRAWINGS

(21) Application No. 36300/66 (22) Filed 12 Aug. 1966

(23) Complete Specification filed 13 Oct. 1967

(45) Complete Specification published 23 Sept. 1970

(51) International Classification B 32 b 27/12 27/30

(52) Index at acceptance

B5N 177 178 189 191 192 20Y 22X 22Y 250 254X 254Y 255X 258X 260X 265X 320 326X 344 348 353 354 355 371 374 404 414 425 428 540 541 545 552 555 55X 55Y 565 591 620 621 627 628 62X 62Y 639 63X 655 656 660 663 665 666 667 669 670 674 679 67X 682 687 688 68X 69X 750 758 763 766 769 784 790

B2E 17X 17Y 184 186 187 189 18Y 204 207 20X 20Y 23Y 24Y 299 305 307 319 31Y 339 359 365 367 368 372 37Y 380 386 38X 38Y 410 416 417 41X 41Y 420 435 43Y 445 44Y 473 478 485 486 487 498 508 515 517 52Y 531 568 575 577 578 588 58Y 590 596 59X 59Y 620 626 627 62X 62Y 630 638 659 65Y 669 671 708 718 722 725 727 729 739 73Y 768 778 785 787 788 798 799 79Y 806

(72) Inventor DENNIS ARTHUR MOSS

(54) IMPROVEMENTS IN OR RELATING TO FLOORING MATERIALS AND METHODS FOR THE MANUFACTURE THEREOF

(71) We, THE MARLEY TILE COMPANY LIMITED, a British Company of London Road, Riverhead, Sevenoaks, Kent, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flooring materials and methods for the manufacture thereof.

It is known to manufacture flooring materials by spreading a coating of a polyvinyl chloride paste type resin, mixed with additives such as plasticisers, stabilisers, viscosity depressants and pigments, on to one side of a fibrous substrate such as a woven hessian fabric, woven hessian with needled jute fibres or a flooring felt impregnated with a resinous binder, for example asphalt, polyvinyl acetate or a synthetic rubber. The vinyl resin coating is then gelled by passing the coated substrate through an oven. The substrates hitherto used in such floorings have frequently been of a thickness of the order of at least 0.03 inches and have therefore provided a substantial portion of the total thickness of the flooring material, which may in all be as little as 0.05 inches.

Flooring materials prepared in this way have been found to suffer from two major defects. First they exhibit the phenomenon of "face curl", that is a tendency of the edges of the flooring material to raise themselves from the floor after laying. This appears to be caused by a relative shrinkage of the vinyl resin layer as compared with the substrate, the latter having a lower thermal co-efficient of expansion and also a tendency to expand and contract with changing humidity. Secondly, the flooring materials have relatively poor indent properties as compared with a flooring material consisting of laminated vinyl resin sheets without a substrate. Thus, a standard exerted pressure results in a deeper lasting impression in the flooring materials which include a fibrous substrate providing a substantial portion of the total thickness of the flooring than in a flooring material consisting entirely of laminated vinyl resin sheets.

It is an object of the present invention to provide a method of manufacturing a flooring material including a fibrous substrate which can be used to produce a flooring material which is not subject to face curl and which has good indent properties.

According to one feature of the present invention, there is provided a method of manufacturing flooring material which comprises (1) applying a layer of a vinyl resin composition on to one side of a fibrous substrate (as herein defined), and (2) applying a second layer of a vinyl resin composition on to the other side of the said fibrous substrate; the layer of vinyl resin composition which is to be face downwards upon

laying the flooring material being of greater thickness than the layer of vinyl resin composition which is to be face upwards upon laying the flooring material; and at least one of the layers of vinyl resin composition being applied as a calendered vinyl resin layer.

According to a further feature of the present invention, there is provided flooring material comprising a fibrous substrate (as herein defined), a gelled vinyl resin layer bonded to one side thereof and a layer of pre-formed calendered vinyl resin film bonded to the opposite side thereof, the layer which is to be face downwards upon laying of the flooring material being of greater thickness than the layer which is to be face upwards on laying of the flooring material.

According to a still further feature of the present invention, there is provided flooring material comprising a fibrous substrate (as herein defined), a gelled vinyl resin layer bonded to one side thereof, a layer of pre-formed calendered vinyl resin film bonded to the opposite side thereof and a vinyl resin wear layer bonded to the top layer which is to be face upwards on laying of the flooring material, the bottom layer which is to be face downwards on laying of the flooring material being of greater thickness than said top layer.

The expression "fibrous substrate" is used herein to designate substrates which are fibrous throughout their thickness whereby in the method according to the present invention the layers of vinyl resin composition applied in steps (1) and (2) come into direct contact with the fibrous material of the substrate.

One preferred method according to the present invention includes the steps of (1) applying a layer of a spreadable vinyl resin composition in the form of a paste on to one side of the substrate; (2) gelling the said layer; and (3) applying a calendered vinyl resin film on to the other side of the said substrate. The calendered vinyl resin film is advantageously of greater thickness than the layer formed by spreading, the calendered film thus providing the layer which is to be face downwards upon laying the flooring material.

In carrying out the method according to the invention, it will be generally be convenient to provide vinyl resin wear layer on the top layer, that is the layer which is to be face upwards upon laying of the flooring material. Where such a wear layer is to be provided, it may for example be formed by coating the top layer with a vinyl resin composition in the form of a paste, again followed by gelling. Alternatively, the wear layer may be added by lamination using a preformed calendered vinyl resin film. A transparent wear layer thus prepared will usually possess somewhat improved stain resistance as compared with a transparent wear layer prepared by the technique using a vinyl resin composition in the form of a paste. Also, where a design is to be printed on to the flooring material using a multiple colour printing press, it is more convenient to print on a relatively thin calendered wear layer than on the top layer of the relatively thick flooring material.

In a particularly preferred method according to the invention, a layer of a spreadable vinyl resin composition in the form of a paste is first applied on to one side of the substrate followed by gelation. A wear layer is next applied on to the gelled vinyl resin layer, after which a calendered vinyl resin film is applied on to the other side of the substrate.

The substrate on which the bottom and top layers are applied is preferably of a thickness in the range of from 0.004 to 0.030 inches, particularly 0.004 to 0.020 inches. Various types of fibrous e.g. fabric substrate may be employed, non-woven fabrics being preferred. Fibrous materials may be of synthetic or natural origin, viscose being particularly suitable, bonded in the case of non-woven fabrics with such substances as polyvinyl alcohol, polyvinyl acetate or synthetic rubbers. A non-woven fabric of glass tissue is especially preferred. Other suitable fibrous substrates include rubber-impregnated paper and woven fabric such as woven cotton and hessian materials. The material selected as substrate is preferably one through which a vinyl resin composition in the form of a paste can penetrate. Thus, when a vinyl resin layer is first formed on one side of the substrate by application of such a paste, the paste penetrates through the substrate and helps to bind the calendered vinyl resin film subsequently applied to the other side of the substrate.

The spreadable vinyl resin composition in the form of a paste (conveniently used for the application of the layer to be face upwards upon laying the flooring material) will in general comprise a vinyl chloride homopolymer or copolymer together with additives necessary to the formation of a satisfactory vinyl resin layer after gelling. The additives may include plasticiser together with for example stabilisers, fillers, pigments and viscosity depressants.

The proportions in which the additives are used when preparing a particular layer will depend upon the purpose to be served by the layer in the flooring material. Thus, as explained hereinafter, different proportions of additives will be required when the layer is to be protected by a separate wear layer from when the layer is itself to provide the wear layer of the flooring material. The

various constituents of the spreadable vinyl resin composition are intimately mixed to a paste prior to spreading.

The vinyl chloride homopolymer or copolymer incorporated in the spreadable vinyl resin composition preferably comprises vinyl chloride homopolymer, conveniently in the form of polyvinyl chloride paste type resin. A particularly suitable paste type resin is that marketed by Imperial Chemical Industries under the trade name P 65—54. The advantage of this paste type resin is that it provides a vinyl resin composition having relatively low viscosity at low plasticiser content and therefore relatively good spreading properties.

The spreadable vinyl resin composition may also contain a proportion of filler, the quantity depending upon the properties required of the layer to be formed using the composition. If the layer is to act as a wear layer, then the less filler used the better will be the abrasion resistance and stain resistance of the layer. In such circumstances it is preferable to use no filter at all. If on the other hand the layer is to be protected by a separate wear layer, a relatively large proportion of filler will generally be used for economic reasons. The upper limit of the quantity of filler which may be used is set by the requirement that the composition should be spreadable, and the proportion of filler will preferably not be greater than 450 parts by weight for every 100 parts by weight of vinyl resin in the composition. A convenient range of proportions for the filler is 100 to 300 parts by weight for every 100 parts by weight of vinyl resin. Various inert inorganic substances may be used as filler, the most convenient being calcium carbonate in the form of whiting, precipitated chalk, ground limestone or ground dolomite. The average particle size of the filler is preferably from 65 to 150 microns.

The spreadable vinyl resin composition will also in general contain a proportion of plasticiser, and, as stated above, the higher the quantity of filler used the higher also will be the quantity of plasticiser necessary. Where the quantity of filler is 100 parts by weight for every 100 parts by weight of vinyl resin, about 50 parts by weight of plasticiser per 100 parts by weight of resin will usually be needed. Where the proportion of filler is as high as 450 parts by weight, on the other hand, about 85 to 90 parts by weight of plasticiser will generally have to be used. Phthalate plasticisers are preferred, particularly nonyl, octyl, butyl, butyl benzyl and, most preferably, dialphanol phthalates. Phosphate plasticisers may also conveniently be used, e.g. trixylenyl and tri-cresyl phosphates. Certain plasticisers (in particular the phosphates and dibutyl phthalate and butyl benzyl phthalate) have a disadvantage in that they give rise to vinyl resin compositions of high initial viscosity and also cause rapid increase of viscosity of the compositions. Thus, where such plasticisers are used, the spreadable vinyl resin compositions must of course be used before undue thickening takes place.

It is in general preferable to incorporate into the spreadable vinyl resin compositions which contain polyvinyl chloride resin a quantity of a stabiliser, that is a substance capable of retarding decomposition of the resin during gelling. Barium cadmium soap is an eminently suitable stabiliser, and other substances which may be used include certain organo-tin compounds, e.g. dibutyl tin dilaurate and lead-containing compounds such as dibasic lead carbonate and lead stearate. The proportion of stabiliser in the spreadable vinyl resin composition is usually quite small, a quantity in the range of from 1 to 3 parts by weight for every 100 parts by weight of polyvinyl chloride resin in general being adequate.

The spreadable vinyl resin compositions will also normally contain pigments selected to give a desired colour. The nature and proportion of pigment used will of course depend upon the colour and shade of flooring material to be prepared. Inorganic pigments (e.g. iron oxide pigments and cadium reds) and organic pigments (e.g. benzidine yellows and phthalocyanine blues and greens) may conveniently be employed.

It is essential that the vinyl resin composition should be spreadable, and where necessary a viscosity depressant may be added to the composition to improve its spreadability. Hexylene glycol is a convenient viscosity depressant, and a particularly suitable viscosity depressant is that sold by Imperial Chemical Industries under the trade name "Lubrol" MOA, the word "Lubrol" being a registered Trade Mark.

The vinyl resin composition is conveniently spread on to the substrate at about room temperature. In a preferred method, the layer is coated on to the substrate at room temperature and the coated substrate is then passed through an oven at a temperature of about 155 to 175°C whereby gelation of the layer is effected. The exact gelling temperature necessary depends upon the resin and plasticiser used whilst the period of time needed for gelation depends upon the thickness of the layer. Layers thicker than 0.03 inches are difficult to gel, prolonged heating being necessary.

The coating may be spread on to the substrate by methods known per se. Thus, for instance the coating may be formed using a spreading knife such as a doctor blade with over-roll or over-blanket spreading. Alternatively, roller coaters, hot melt coaters and extrusion coaters may be used.

Where it is desired to provide a decorative pattern on the floor material, it is next usually necessary to add a transparent wear layer on to the top layer of the flooring material. The pattern may be printed on to the top layer after gelation, and then the transparent wear layer added. Where the transparent wear layer is provided by a calendered film, another technique is to print the pattern on to the side of the transparent wear layer which is placed face downwards on to the top layer. The decorative pattern is then protected by the full thickness of the wear layer. Alternatively the wear layer may be embossed after application, the depressed areas then being infilled with a different polyvinyl chloride resin composition. Where the wear layer is formed by coating using a spreadable vinyl resin composition in the form of a paste, the vinyl resin composition preferably contains no filler. The composition also advantageously contains a proportion of a solvent such as aliphatic mineral spirit. The resultant fall in viscosity enables the proportion of plasticiser to be reduced and thereby lessens the tendency of the wear layer to stain due to the presence of a high proportion of plasticiser. Where the wear layer is provided by a preformed calendered film, this may be prepared by method known per se for the production of vinyl resin calendered films.

Plain coloured or mottled floor materials may be prepared without the additional wear layer, the top layer acting also as wear layer. A mottled effect may be achieved by adding to the spreadable vinyl resin composition used in the preparation of the top layer a small quantity of a differently coloured vinyl resin composition. The flooring material can be given a smooth surface by rolling, for example with a smooth chromium plated roller, after gelation or alternatively, an embossed pattern may be applied using a patterned roller.

The bottom layer of the flooring material is applied on to the substrate in the form of a calendered vinyl resin film. The calendered film conveniently consists of a vinyl resin composition including vinyl chloride homopolymer or copolymer together with additives such as for example plasticisers, fillers, stabilisers, etc. The calendered film can if desired be preformed and can then be applied on to the substrate with the aid of a suitable adhesive such as a synthetic rubber solution of a well known type. Alternatively the substrate may be applied on to the calendered film whilst still in contact with the final calendering roller. The substrate in this method is one which has allowed some penetration of paste from the previous application of the top layer, and the substrate and calendered film are laminated together whilst the calendered film is in contact with one of the final calendering rollers, conveniently by means of an additional roller which together with the final calendering roller serves to press the substrate and calendered film together. In a still further alternative process, the substrate is passed together with the calendered film through the nip between the final two calendering rollers whereby lamination is effected. The paste which has penetrated through the substrate will generally be heated prior to application of the calendered film.

The provision of vinyl resin layers on both sides of the substrate results in a reduction in the tendency of the flooring material to exhibit face curl, the bottom layer counteracting any tendency for the top layer to cause raising of the edges of the flooring material. The bottom layer is made thicker than the top layer so that it more than compensates for any effect of the top layer. In flooring materials prepared in this way, the central area of the flooring material rather than its edges has a possible tendency to raise itself after laying but the weight of the flooring material is sufficient to overcome this tendency. Where a separate wear layer is to be added to the top layer, the bottom layer is preferably made of a thickness greater than the combined thicknesses of the top and wear layers. The top layer is conveniently of a thickness in the range of 0.01 to 0.04 inches, the wear layer, where it exists, of a thickness in the range of 0.004 to 0.02 inches and the bottom layer greater than the thickness of the top layer plus, where it exists, the thickness of the wear layer. The bottom layer preferably has a thickness of not more than 0.06 inches. It will be appreciated that the thickness of the various layers should be selected to provide an adequate thickness of the final flooring material, which is generally at least 0.04 inches or, more commonly, at least 0.05 inches.

The following example illustrates the invention:—

EXAMPLE

A non-woven fabric consisting of viscose bonded with polyvinyl alcohol and weighing 45 grams per square metre, was coated on one side with a layer having the following composition:

Polyvinyl chloride paste type resin	100.0 pts.
Phthalate plasticiser	60.0 pts.
Barium cadmium soap stabiliser	2.0 pts.
Fine particle size inorganic filler	100.0 pts.
Pigment	5.0 pts.

A thickness of 0.010" was applied by doctor blade with sufficient penetration of the paste through the fabric to give a layer of poly-

vinyl chloride resin composition which will ensure satisfactory bonding properties after subsequent lamination to a calendered polyvinyl chloride resin base. The coated fabric was then passed through an oven at a temperature sufficient to gel the coating. A wear surface, of the following composition, was then superimposed on to this coating;

Polyvinyl chloride paste type resin	100.0 pts.
Phthalate plasticiser	35.0 pts.
Barium cadmium soap stabiliser	2.0 pts.
Viscosity depressant	2.0 pts.
Pigment	3.0 pts.

A thickness of 0.020" was applied by doctor blade and gelled in an oven, the surface then being embossed with a decorative pattern. The embossed areas were then filled with a plastisol, of similar composition but of a different colour to the wear surface material, by passing the embossed surface beneath a doctor blade, under sufficient pressure to remove the applied plastisol from the top surfaces. The infilling plastisol was then gelled in an oven and the surface of the flooring was given a smooth or slightly textured surface by passing through an embossing head, containing the appropriate finishing roller, at the end of the heating tunnel.

The material obtained had a total thickness of approximately 0.030" and this was then increased to a thickness more suitable for flooring by laminating a calendered sheet to the base side of the coated material. This film was calendered to a thickness of 0.050" and was prepared from the following composition:

Polyvinyl chloride resin	10.0 pts.
Phthalate plasticiser	42.0 pts.
Barium cadmium soap stabiliser	2.0 pts.
Inorganic filler	150.0 pts.

The calendered film was laminated to the coated material by preheating the base side of the material with radiant heaters and then applying to the hot calendered sheet in a pressure nip formed by a rubber and a metal roll.

WHAT WE CLAIM IS:—

1. A method of manufacturing flooring materials which comprises (1) applying a layer of a vinyl resin composition on to one side of a fibrous substrate (as herein defined), and (2) applying a second layer of a vinyl resin composition to the other side of the said fibrous substrate; the layer of vinyl resin composition which is to be face downwards upon laying the flooring material being of greater thickness than the layer of vinyl resin composition which is to be face upwards upon laying the flooring material; and at least one of the layers of vinyl resin composition being applied as a calendered vinyl resin layer.

2. A method as claimed in claim 1 which comprises (1) applying a layer of a spreadable vinyl resin composition in the form of a paste on to one side of the fibrous substrate; (2) gelling the said layer; and (3) applying a calendered vinyl resin film on to the other side of the fibrous substrate.

3. A method as claimed in claim 2 in which the calendered vinyl resin film is of greater thickness than the layer formed by spreading.

4. A method as claimed in any of the preceding claims in which a vinyl resin wear layer is provided on the top layer which is to be face upwards upon laying of the flooring material.

5. A method as claimed in claim 4 in which the top layer is formed by applying a spreadable vinyl resin composition in the form of a paste on to one side of the fibrous substrate followed by gelation; a wear layer is then applied on to the gelled vinyl resin layer, and a calendered vinyl resin film is thereafter applied on to the other side of the fibrous substrate.

6. A method as claimed in claim 5 in which the wear layer is applied by coating the top layer with a vinyl resin composition in the form of a paste and subsequently gelling the layer thus formed.

7. A method as claimed in claim 5 in which the wear layer is applied by lamination using a pre-formed calendered vinyl resin film.

8. A method as claimed in claim 6 or claim 7 in which the wear layer is transparent.

9. A method as claimed in any of claims 4 to 8 in which the vinyl resin wear layer is from 0.004 to 0.02 inches thick.

10. A method as claimed in any of the preceding claims in which the fibrous substrate is from 0.004 to 0.030 inches thick.

11. A method as claimed in claim 10 in which the fibrous substrate is from 0.004 to 0.020 inches thick.

12. A method as claimed in any of the preceding claims in which the top layer which is to be face upwards upon laying of the flooring material is from 0.01 to 0.04 inches thick.

13. A method as claimed in any of the preceding claims in which the bottom layer which is to be face downwards upon laying of the flooring material is not more than 0.06 inches thick.

14. A method as claimed in any of the preceding claims in which the total thickness

of the flooring material produced is at least 0.04 inches.

15. A method as claimed in claim 14 in which the total thickness of the flooring material produced is at least 0.05 inches.

16. A method as claimed in any of the preceding claims in which the fibrous substrate is a non-woven fabric.

17. A method as claimed in claim 16 in which the fibrous substrate comprises a non-woven fabric of glass tissue.

18. A method as claimed in claim 16 in which the fibrous substrate comprises viscose fibres bonded with polyvinyl alcohol, polyvinyl acetate or synthetic rubbers.

19. A method as claimed in any of claims 1 to 15 in which the fibrous substrate is rubber-impregnated paper.

20. A method as claimed in any of claims 1 to 15 in which the fibrous substrate is a woven fabric.

21. A method as claimed in claim 2 in which the spreadable vinyl resin composition used in the formation of the gelled bottom or top layer on the fibrous substrate comprises a vinyl resin together with a plasticiser, stabiliser, filler, pigment and/or viscosity depressant, the said composition being in the form of a paste.

22. A method as claimed in claim 21 in which the vinyl resin comprises polyvinyl chloride.

23. A method as claimed in claim 22 in which the polyvinyl chloride is in the form of polyvinyl chloride paste type resin.

24. A method as claimed in any of claims 21 to 23 in which the spreadable vinyl resin composition used in the formation of the gelled bottom or top layer contains calcium carbonate in the form of whiting, precipitated chalk, ground limestone or ground dolomite as filler.

25. A method as claimed in claim 24 in which the average particle size of the filler is from 65 to 150 microns.

26. A method as claimed in any of claims 21 to 25 in which the spreadable vinyl resin composition used in the formation of the gelled bottom layer or top layer contains up to 450 parts by weight of filler per 100 parts by weight of vinyl resin.

27. A method as claimed in claim 26 in which the said spreadable vinyl resin composition contains from 100 to 300 parts by weight of filler per 100 parts by weight of vinyl resin.

28. A method as claimed in any of claims 21 to 27 in which the spreadable vinyl resin composition used in the formation of the gelled bottom or top layer contains a phthalate or phosphate plasticiser.

29. A method as claimed in claim 28 in which the phthalate or phosphate plasticiser is nonyl, octyl, butyl, butyl benzyl or di-alphanol phthalate, or tri-xylenyl or tri-cresyl phosphate.

30. A method as claimed in any of claims 21 to 29 in which the spreadable vinyl resin composition used in the formation of the gelled bottom or top layer contains barium cadmium soap as stabiliser.

31. A method as claimed in any of claims 21 to 30 in which the spreadable vinyl resin composition used in the formation of the gelled bottom or top layer contains from 1 to 3 parts by weight of stabiliser per 100 parts by weight of vinyl resin.

32. A method as claimed in any of claims 21 to 31 in which the spreadable vinyl resin composition used in the formation of the gelled bottom or top layer contains hexylene glycol as a viscosity depressant.

33. A method as claimed in any of claims 21 to 32 in which the vinyl resin wear layer is provided on the gelled top layer by coating the gelled top layer with a spreadable vinyl resin composition comprising a vinyl resin together with a plasticiser, stabiliser, pigment, viscosity depressant and/or solvent, the said composition being in the form of a paste, followed by gelling of the layer thus formed.

34. A method as claimed in claim 33 in which the vinyl resin is as defined in claim 22 or claim 23.

35. A method as claimed in claim 33 or claim 34 in which the spreadable vinyl resin composition contains a plasticiser as defined in claim 28 or claim 29.

36. A method as claimed in any of claims 33 to 35 in which the spreadable vinyl resin composition contains a stabiliser as defined in claim 30.

37. A method as claimed in any of claims 33 to 36 in which the proportion of stabiliser in the spreadable vinyl resin composition is as defined in claim 31.

38. A method as claimed in any of claims 33 to 37 in which the spreadable vinyl resin composition contains a viscosity depressant as defined in claim 32.

39. A method as claimed in any of claims 33 to 38 in which the spreadable vinyl resin composition contains aliphatic mineral spirit as solvent.

40. A method as claimed in any of claims 1 to 39 in which the calendered vinyl resin film on one side of the fibrous substrate is pre-formed and applied to the fibrous substrate with the aid of an adhesive serving to bond the pre-formed calendered film to the substrate.

41. A method as claimed in claim 40 in which the adhesive is a polyvinyl chloride plastisol.

42. A method as claimed in claim 1 substantially as herein described.

43. A method as claimed in claim 1 substantially as herein described in the Example.

44. Flooring material when manufactured

by a method as claimed in any of claims 1 to 43.

45. Flooring material comprising a fibrous substrate (as herein defined), a gelled vinyl resin layer bonded to one side thereof and a layer of pre-formed calendered vinyl resin film bonded to the opposite side thereof, the layer which is to be face downwards upon laying of the flooring material being of greater thickness than the layer which is to be face upwards on laying of the flooring material.

46. Flooring material comprising a fibrous substrate (as herein defined), a gelled vinyl resin layer bonded to one side thereof, a layer of pre-formed calendered vinyl resin film bonded to the opposite side thereof and a vinyl resin wear layer bonded to the top layer which is to be face upwards on laying of the flooring material, the bottom layer which is to be face downwards on laying of the flooring material being of greater thickness than said top layer.

47. Flooring material as claimed in claim 46 in which the vinyl resin wear layer is a calendered vinyl resin film.

48. Flooring material as claimed in claim 46 or claim 47 in which the bottom layer has a thickness greater that the combined thickness of the top layer and the wear layer.

49. Flooring material as claimed in any of claims 45 to 48 in which the fibrous substrate has a thickness as specified in claim 10 or claim 11.

50. Flooring material as claimed in any of claims 45 to 49 in which the top layer has a thickness as specified in claim 12.

51. Flooring material as claimed in any of claims 45 to 50 in which the bottom layer has a thickness as specified in claim 13.

52. Flooring material as claimed in any of claims 46 to 51 in which a vinyl resin wear layer is provided on the top layer having a thickness as specified in claim 9.

53. Flooring material as claimed in any of claims 45 to 52 which has a thickness as specified in claim 14 or claim 15.

54. Flooring material as claimed in any of claims 45 to 53 substantially as herein described.

55. Flooring material substantially as herein described in the example.

For the Applicants,
FRANK B. DEHN & CO.,
Chartered Patent Agents,
Imperial House,
15/19, Kingsway,
London, W.C.2.

Printed for Her Majesty's Stationery Office, by the Courier Press, Leamington Spa, 1970.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY. from which copies may be obtained.